

NIF

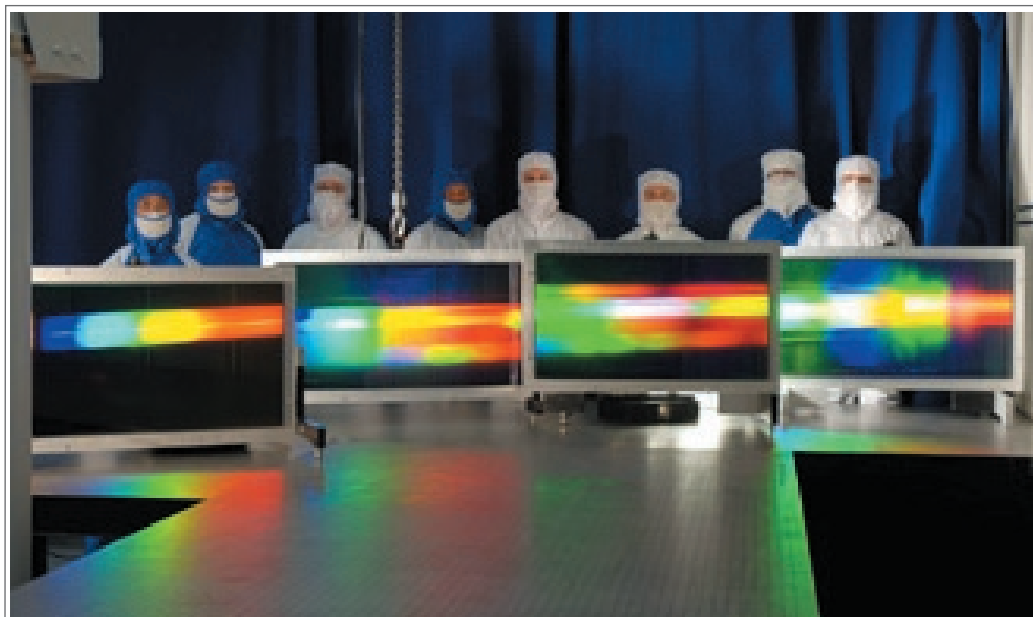
National Ignition Facility & Photon Science
Bringing Star Power to Earth

Advanced Optical Components & Technology

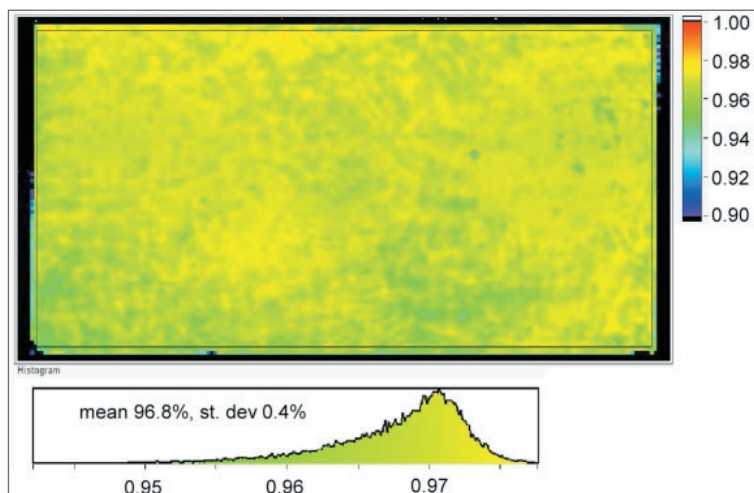
Multilayer Dielectric-Reflection Diffraction Gratings

AOCT designs and manufactures custom multilayer dielectric (MLD) gratings for high-energy Petawatt (10^{15} watt) short pulse laser compression as well as for high average-power applications. These plane gratings are designed to operate in reflection. We have made several square meters of gratings for operation at 1030, 1053, 1064 nm and even broadband Ti:Sapphire systems operating at high rep rate.

In 2008 we began production of 40 meter-scale MLD gratings for the NIF ARC project. These are the largest such gratings ever made. Each of these 4 gratings shown has ~97% average diffraction efficiency at use conditions.



Left to right: Hoang Nguyen, Cindy Larson, Curly Hoaglan, Jim Peterson, Mike Aasen, Tom Carlson, James Nissen, Jerry Britten.

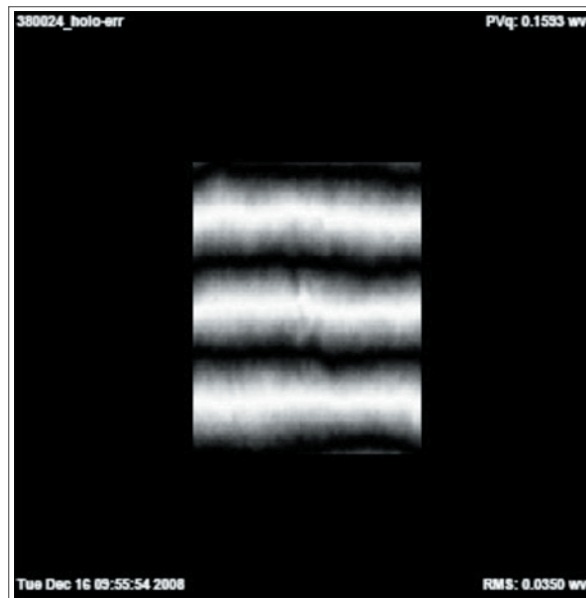
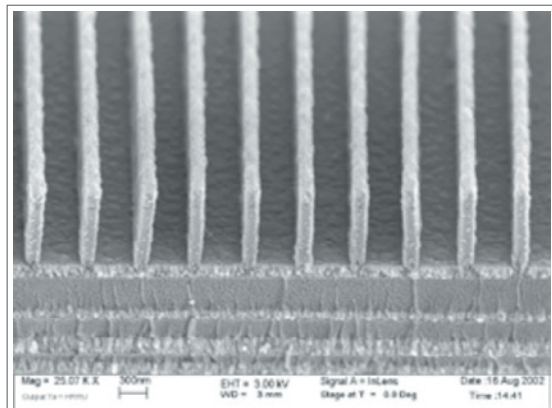


Full aperture diffraction efficiency map of a 910x450 mm MLD grating, 1752 lines/mm, for 1053 nm light into the -1 order at 76.2° incidence, TE polarization. Average diffraction efficiency 96.8%.

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Advanced Optical Components & Technology – Gratings

Synthetic fringe map (right) of holographic phase error (wavefront) of 910x450 mm 1752 l/mm grating at the Littrow mount. 0.15 waves peak-to-valley. The flatness of the diffracted wavefront of these optics is currently limited by coating stresses. We are working to get this level down to ~0.2 waves.

**Grating Microstructure**

Microstructure of a MLD grating. Line spacing is about 550 nm.

